

Red and Bonita 2015 Dissolved Metals Concentrations Compared to Post-Treatment Water Quality
All concentrations shown in micrograms per liter (µg/L) except as noted

Location	CC03D Red and Bonita at Road Culvert		Average 2015	Water Treatment Effluent		Average Water Treatment	Relative Percent Difference
Sample Date	6/25/2015	7/15/2015		7/23/2015	7/23/2015		
Aluminum	2350	2030	2190	1400	1200	1300	-51%
Antimony	<5.00	<5.00	NA	10 U	10 U	NA	NA
Arsenic	<5.00	<5.00	NA	10 U	10 U	NA	NA
Barium	<50.0	<50.0	NA	50 U	50 U	NA	NA
Beryllium	5.38	5.43	5.405	2 U	2 U	NA	NA
Cadmium	21.2	20.6	20.9	21	19	20	-4%
Calcium	403,000	411,000	407,000	350,000	360,000	355,000	-14%
Chromium	<10.0	<10.0	NA	10 U	10 U	NA	NA
Cobalt	95.8	90.4	93.1	51	48	49.5	-61%
Copper	31.6	23.8	27.7	110	99	104.5	116%
Hardness*	1110	1120	1115	--	--	NA	NA
Iron	82,100	80,600	81,350	8200	7400	7800	-165%
Lead	2.76	1.55	2.155	14	10	12	139%
Magnesium	24,300	23,700	24,000	19,000	19,000	19,000	-23%
Manganese	29,200	29,700	29,450	20,000	19,000	19,500	-41%
Molybdenum	<10.0	<10.0	NA	--	--	NA	NA
Nickel	35.5	49	42.25	21	19	20	-71%
Potassium	1470	1410	1440	1700	1700	1700	17%
Selenium	<10.0	<10.0	NA	20 U	20 U	NA	NA
Silver	<5.00	<5.00	NA	5 U	5 U	NA	NA
Sodium	7930	7620	7775	100,000	110,000	105,000	172%
Strontium	4410	4300	4355	--	--	NA	NA
Thallium	<5.00	<5.00	NA	10 U	10 U	NA	NA
Vanadium	<20.0	<20.0	NA	10 U	10 U	NA	NA
Zinc	14,300	15,100	14,700	6500	6000	6250	-81%

Relative percent difference is positive if there was a net increase in metals after treatment and negative if there was a net decrease in metal concentration after treatment.
Hardness reported in units of milligrams per liter (mg/L)

Observations Regarding Dissolved Metals Concentrations:

- The net sodium increase was due to addition of sodium hydroxide used to increase pH to enhance the effectiveness of Brennfloc.
- Copper and lead concentrations increased after treatment, likely due to mobilization of these contaminants during mine sediment removal.
- Cadmium concentration remained relatively constant.
- Aluminum, cobalt, iron, manganese, nickel, and zinc concentrations decreased markedly. This is likely due to addition of caustic and precipitation onto site solids.

Red and Bonita 2015 Total Metals Concentrations Compared to Post-Treatment Water Quality
All concentrations shown in micrograms per liter (µg/L) except as noted

Location	CC03D Red and Bonita at Road Culvert		Average 2015	Water Treatment Effluent		Average Water Treatment	Relative Percent Difference
Sample Date	6/25/2015	7/15/2015		7/23/2015	7/23/2015		
Aluminum	4180	3890	4035	1800	2600	2200	-55%
Antimony	<5.00	<5.00	NA	10 U	10 U	NA	NA
Arsenic	5.67	<5.00	5.67	10 U	10 U	NA	NA
Barium	<50.0	<50.0	NA	14	17	15.5	NA
Beryllium	6.67	6.35	6.51	2 U	2 U	NA	NA
Cadmium	23.7	19.7	21.7	23	23	23	6%
Calcium	397000	384000	390500	350,000	350,000	350000	-11%
Chromium	<10.0	<10.0	NA	10 U	10 U	NA	NA
Cobalt	95.6	91.3	93.45	56	47	51.5	-60%
Copper	45.5	30.8	38.15	150	160	155	118%
Iron	83500	79700	81600	18,000	25,000	21500	-113%
Lead	82.9	73.3	78.1	67	100	83.5	6%
Magnesium	24300	23400	23850	21,000	18,000	19500	-21%
Manganese	29200	28400	28800	21,000	17,000	19000	-43%
Molybdenum	<10.0	<10.0	NA	--	--	NA	NA
Nickel	37.1	33.1	35.1	23	19	21	-52%
Potassium	1520	1450	1485	1700	1700	1700	14%
Selenium	<10.0	<10.0	NA	20 U	20 U	NA	NA
Silver	<5.00	<5.00	NA	5 U	5 U	NA	NA
Sodium	7850	7560	7705	100,000	110,000	105000	165%
Thallium	42.4	<5.00	42.4	10 U	10 U	NA	NA
Vanadium	<20.0	<20.0	NA	10 U	10 U	NA	NA
Zinc	13700	13100	13400	7100	5800	6450	-72%

Relative percent difference is positive if there was a net increase in metals after treatment and negative if there was a net decrease in metal concentration after treatment.
Hardness reported in units of milligrams per liter (mg/L)

Observations Regarding Total Metals Concentrations:

- The net sodium increase was due to addition of sodium hydroxide used to increase pH to enhance the effectiveness of Brennfloc.

- Copper concentrations increased after treatment, likely due to mobilization during mine sediment removal.
- Cadmium and lead concentrations were slightly increased after treatment.
- Aluminum, cobalt, iron, manganese, nickel, and zinc concentrations decreased markedly. This is likely due to addition of caustic and precipitation onto site solids.